

## New records of freshwater fishes from East Timor

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In October, 2003, the junior author had the opportunity to visit East Timor and collect freshwater fishes from several localities: from rivers near Aileu in the central mountains across to Lake Ira Lalaro near the eastern tip of the island. This collection is significant as very little is known of the freshwater fish fauna of the island of Timor. Full details of the aquatic habitats encountered and their ecology will be published separately.

Few freshwater fishes have ever been reported from Timor, and nearly all of them were obtained from localities in what is now West Timor in Indonesia or with no specific locality provided (e.g. Reuvens 1895; Weber and de Beaufort 1912, 1922; Allen 1991). Those with localities provided were mostly from around Kupang, Atapupu and Atambua. The most useful recent summary of Indonesian freshwater fishes (Kottelat *et al.* 1993) did not include Timor in its coverage. The provisional checklist of freshwater fishes of Nusa Tenggara (Monk *et al.* 1997) lists a few Timor species, but only general locations are provided. Species previously known from fresh water in Timor are listed in Table 1.

At present, only one freshwater fish may be endemic to the island: *Oryzias timorensis* (Weber and de Beaufort, 1922), described from Mota Talau (near Atambua in West Timor). This species was not obtained during the present survey.

The East Timor fishes were obtained from a range of habitats, from mountain rivers to coastal estuaries (Table 1). It must be noted that for some of the species listed in the table, the taxonomy of these is not resolved and/or the fish are difficult to identify, such as the freshwater eels *Anguilla*, species of the goby genus *Awaous* and the sicydiine gobies (*Sicyopterus*, *Stiphodon*, *Lentipes*).

Twenty-eight species are here recorded for the first time for East Timor. Ten of these have also been reported from West Timor. Another 20 species are known from West Timor, a number of which are marine

to estuarine, such as *Acanthurus*, *Liza* and *Atherinomorus*. These species numbers are provisional, as the identification of the *Anguilla* and *Sicyopterus* species is uncertain. The present collection includes the first record of a freshwater hardyhead (Atherinidae) for Timor. This was from a land-locked stream and is an undescribed species (Ivantsoff, Larson and Crowley in prep.).

Some of the fishes listed in the table are actually marine fish that are known to travel well upstream into fresh water for varying periods. As some of these are known to travel 200–300 km inland, they are here included in the list of freshwater species; Weber and de Beaufort (1912) and Allen (1991) treated such species similarly in their work on New Guinea freshwater fishes.

Indeed, all of East Timor's freshwater fish fauna is essentially marine-derived or has a marine larval stage. The fauna (for the whole island) does not include any strictly freshwater fish species such as the osteoglossid *Scleropages* (there are at least three species in neighbouring regions). A number of Timor fish species are restricted to fresh water (such as the two *Oryzias*, the mullet *Cestraens*, the jungle perch *Kuhlia* and most of the gobioids) but are widespread in the western Pacific and south-east Asian Archipelago. Some of these, such as *Kuhlia* species, are known to spawn in estuarine or marine waters.

The most speciose family of freshwater fishes in East Timor is the Gobiidae, which all probably have estuarine larvae or the adults migrate to estuaries to breed. The stream-gobies of the subfamily Sicydiinae (*Lentipes*, *Sicyopterus* and *Stiphodon*) are island specialists which are widespread elsewhere in Indonesia and New Guinea, with the exception of *Lentipes*. This genus as currently understood consists of 11 poorly known species from widely scattered localities. The East Timor specimen very probably represents an undescribed species.

**Table 1.** Fish species (native and introduced) recorded or recently collected (this survey; localities in bold) from fresh waters of East Timor and West Timor (Indonesia), and their preferred habitat types. Previous fish records from fresh waters of Timor are provided with specific or general locality information as given in the original report. Nomenclature has been updated where identity is clear; original spellings of locations retained. Sources: A = Allen (1991), B = Bleeker (1854, 1857, 1863), C = de Beaufort (1913), D = Weber and de Beaufort (1922), M = Monk *et al.* (1997), R = Reuvens (1895), W = Weber and de Beaufort (1912), † = this survey.

Family and Species	Location	Source	Habitat types	Status	Remarks
<b>MEGALOPIDAE</b>					
<i>Megalops cyprinoides</i>	River near Deli	B, W	Marine to freshwater	Native	Widespread in region
<b>ANGUILLIDAE</b>					
<i>Anguilla australis</i>	River near Deli	B, W	Freshwater (rivers)	Native	Widespread in region
<i>Anguilla celebesensis</i>	River Bele, Distriet Amanzembang	W	Freshwater (rivers)	Native	Widespread in region
<i>Anguilla marmorata</i>	Lake Nefko near Oikabiti; lake near Baun; Noil Besi; River Bele; <b>Vero River</b>	R, W, †	Freshwater (rivers)	Native	Widespread in region
<i>Anguilla reinhardtii</i>	<b>Tchino River</b>	†	Freshwater (rivers)	Native	Australian species
<b>CYPRINIDAE</b>					
<i>Cyprinus carpio</i>	<b>Mota Dai Soli (Laelo River)</b>	†	All freshwater habitats	Feral	Widely introduced
<b>CLARIIDAE</b>					
<i>Clarias gariepinus</i>	<b>Lake Ira Lalaro</b>	†	All freshwater habitats	Feral	Widely introduced
<b>POECILIIDAE</b>					
<i>Gambusia affinis</i>	<b>Irasiquero River;</b> <b>Baucau spring; Mota Dai</b> <b>Soli (Laelo River); Mota</b> <b>Monofonihun (Laelo River)</b>	†	All freshwater habitats	Feral	Widely introduced
<i>Poecilia reticulata</i>	<b>Baucau spring; Mota</b> <b>Monofonihun (Laelo River)</b>	†	All freshwater habitats	Feral	Widely introduced
<b>ADRIANICHTHYIDAE</b>					
<i>Aplocheilichthys panchax</i>	<b>Lalcia River; Mota</b> <b>Monofonihun (Laelo River)</b>	†	All freshwater habitats	Feral	Widely introduced
<i>Oryzias celebensis</i>	River Mota Talau area	W	Freshwater	Native	
<i>Oryzias timorensis</i>	mid-Timor, Mota Talau; Timor	D, M	Freshwater	Native	Endemic?
<b>ATHERINIDAE</b>					
<i>Atherinomorus lacunosus</i>	River near Deli	B, W	Estuarine to freshwater	Native	Widespread in region
<i>Craterocephalus</i> sp.	<b>Irasequero River</b>	†	Freshwater; clear rivers	Native	Undescribed species
<b>SYNGNATHIDAE</b>					
<i>Microplis retzii</i>	Timor	C	Freshwater	Native	Widespread in region
<b>AMBASSIDAE</b>					
<i>Ambassis buruensis</i>	River near Kupang; Timor	W, M, A	Estuarine to freshwater	Native	Widespread in region
<i>Ambassis dussumieri</i>	Timor	C	Estuarine to freshwater	Native	Widespread in region
<i>Ambassis macracanthus</i>	River Konino, ueighbourhood of Kupang; <b>Vero River</b>	W, †	Freshwater to estuarine	Native	Widespread in region
<i>Ambassis niops</i>	<b>Vero River</b>	†	Freshwater to estuarine	Native	Widespread in region
<i>Ambassis urotaenia</i>	<b>Vero River</b>	†	Estuarine to freshwater	Native	Widespread in region
<b>SERRANIDAE</b>					
<i>Epinephelus malabaricus</i>	Timor	C	Marine to estuarine	Native	Widespread in region
<b>TERAPONTIDAE</b>					
<i>Mesopristes argenteus</i>	<b>Vero River</b>	†	Estuarine to freshwater	Native	Widespread in region
<i>Mesopristes cancellatus</i>	Noil Aplaal	W			
<i>Terapon jarbua</i>	River near Kupang; <b>Vero River</b>	W, †	Estuarine to freshwater	Native	Widespread in region
<b>CARANGIDAE</b>					
<i>Caranx sexfasciatus</i>	River near Deli	B, W	Marine to estuarine	Native	Widespread in region

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<b>LUTJANIDAE</b>					
<i>Lutjanus argentimaculatus</i>	Timor	C	Marine to freshwater	Native	Widespread in region
<i>Lutjanus fuscescens</i>	Mota Berluli; Timor	W, M	Estuarine to freshwater	Native	Widespread in region
<b>GERREIDAE</b>					
<i>Gerres filamentosus</i>	<b>Vero River</b>	†	Estuarine to freshwater	Native	Widespread in region
<b>KUHLIIDAE</b>					
<i>Kuhlia marginata</i>	River Konino, neighbourhood of Kupang; Noil Bidjeli; Noil Aplaal; <b>Tchino River</b>	W, †	Freshwater to estuarine	Native	Widespread in region
<i>Kuhlia rupestris</i>	Timor Kupang; Noil Aplaal	B, W	Freshwater	Native	Widespread in region
<b>TOXOTIDAE</b>					
<i>Toxotes jaculatrix</i>	Timor-Delhi	B	Freshwater to estuarine	Native	Widespread in region
<b>SCATOPHAGIDAE</b>					
<i>Scatophagus argus</i>	Timor	C	Estuarine to freshwater	Native	Widespread in region
<b>CICHLIDAE</b>					
<i>Oreochromis mossambica</i>	<b>Lake Ira Laloro; Irasiquero</b>	†	Freshwater to estuarine	Feral	Widely introduced
<b>MUGILIDAE</b>					
<i>Cestraeus goldiei</i>	Noil Bidjeli; Timor	W, M, A	Freshwater to estuarine	Native	Widespread in region
<i>Liza subviridis</i>	River near Deli	B, W	Marine to estuarine	Native	Widespread in region
<i>Valamugil (seheli)?</i>	River Konino, neighbourhood of Kupang	W	Marine to estuarine	Native	Widespread in region
<b>ELEOTRIDAE</b>					
<i>Belobranchius belobranchius</i>	River Konino, neighbourhood of Kupang; <b>Tchino River</b>	W, †	Freshwater to estuarine	Native	Widespread in region
<i>Bunaka gyrinoides</i>	Mota Berluli; Noil Enfut; <b>Tchino River; Vero River</b>	W, †	Freshwater to estuarine	Native	Widespread in region
<i>Eleotris fusca</i>	River near Atapupu; <b>Tchino River; Vero River; Lacro River</b>	W, †	Freshwater to estuarine	Native	Widespread in region
<i>Eleotris melanosoma</i>	Atapupu	B	Freshwater to estuarine	Native	Widespread in region
<i>Girris margaritacea</i>	River near Deli; river near Atapupu; Mota Berluli; <b>Vero River</b>	B, W, †	Freshwater to estuarine	Native	Widespread in region
<i>Ophiocara porocephala</i>	Timor	C	Freshwater to estuarine	Native	Widespread in region
<b>GOBIIDAE</b>					
<i>Awaous melanocephalus</i>	River Konino, neighbourhood of Kupang; Mota Berluli; Noil Enfut; <b>Laleia River; Tchino River</b>	W, †	Flowing freshwater	Native	Widespread in region
<i>Glossogobius celebius</i>	River near Kupang; River Konino; Mota Berluli	W	Estuarine to freshwater	Native	Widespread in region
<i>Lentipes</i> sp.	<b>Tchino River</b>	†	Flowing freshwater	Native	Undescribed species
<i>Mugilogobius cavifrons</i>	<b>Irasiquero River</b>	†	Freshwater to estuarine	Native	Widespread in region
<i>Perioplthalmus argentilineatus</i>	<b>Vero River</b>	†	Estuarine to freshwater	Native	Widespread in region
<i>Pseudapoerytes borneensis</i>	Timor	M	Estuarine to freshwater	Native	Widespread in region
<i>Redigobius cf bikolanus</i>	<b>Vero River</b>	†	Flowing freshwater	Native	Possibly undescribed
<i>Sicyopterus cynocephalus</i>	Noil Enfut; Noil Besi	W			
<i>Sicyopterus hageni</i>	Timor; <b>Lacro River</b>	M, A, †	Flowing freshwater	Native	Widespread in region
<i>Sicyopterus micrurus</i>	<b>Mota Dai Soli (Lacro River)</b>	†	Flowing freshwater	Native	Widespread in region
<i>Sicyopterus wichmanni</i>	River near Kupang	W			
<i>Siphodon cf atratus</i>	<b>Lacro River; Vero River</b>	†	Flowing freshwater	Native	Possibly undescribed
<b>ACANTHURIDAE</b>					
<i>Acanthurus nigrofuscus</i>	River near Deli	B, W	Marine	Native	Widespread in region
<b>ANABANTIDAE</b>					
<i>Anabas testudineus</i>	Near Amarassi	R	Freshwater	Native	Widespread in region

The known fish fauna of the whole island of Timor is interesting in that it lacks many Australia-New Guinea groups that might be expected due to its proximity to the region; this was first noted by Weber and de Beaufort (1912). There are no ariids, plotosids, melanotaeniids, pseudomugilids or centropomids, and no eleotrids of the *Mogurnda* or *Oxyeleotris* reported, all of which are widespread and speciose within Australia and New Guinea. Timor's freshwater fauna does include a few species which are not represented in Australia or New Guinea, such as *Anabas testudineus* and *Oryzias celebensis* (de Beaufort 1913). Also, some South-east Asian groups (other than introductions) are also missing, such as eyprinids and anabantoids, and there are no siluriforms at all (bagrids, silurids, akysids). Further sampling of freshwater fish should clarify the faunal assemblage present in East Timor.

One striking feature of the fish list in Table 1 is that the introduced species were all found during the recent survey and were not known previously from the island of Timor. The two poeciliids and the cichlid in particular cause concern, as these are prolific breeders and aggressive in behaviour, thus having a competitive advantage over native fishes. It is to be hoped that no additional non-native species are found with further work in the region.

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